

**REMARKS**

Claims 1 - 14 were pending in the application. Claims 2, 10, and 11 have been canceled; claims 1, 3, 6, 12, and 13 have been amended. Accordingly, claims 1, 3 - 9, and 12 - 14 are presented for reconsideration and further examination in view of the foregoing amendments and following remarks.

In the outstanding Office Action the drawings were objected to under 37 C.F.R. 1.83(a); the specification was objected to under 37 C.F.R. 1.75(d)(1) as failing to provide proper antecedent basis for the claimed subject matter; the title was objected to as not being descriptive; claims 1 - 14 were rejected under 35 U.S.C. § 112, 2<sup>nd</sup> paragraph as being indefinite; claims 1 - 4, 10, and 11 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 4,421,980 to Kühne; claims 5 and 6 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Kühne in view of U.S. Patent No. 4,866,269 to Wlodarczyk et al., claims 7 and 8 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Kühne in view of U.S. Patent No. 6,356,219 to Weibel IV et al.; claim 9 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Kühne in view of U.S. Patent No. 5,686,804 to Siraky; and claim 12 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Kühne; and claims 13 and 14 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. § 112, 2<sup>nd</sup> paragraph.

By this Amendment claims 1, 3, 6, 12, and 13 have been amended. Support for the amendment to claim 1 can be found in original claims 2, 10, 11, and 13 and in the specification on page 5, paragraph beginning on line 25. Claim 3 has been amended to provide antecedent basis for the marker element. Claim 6 has been amended to correct 35 U.S.C. § 112, 2<sup>nd</sup> paragraph problems.

Claims 12 and 13 have been amended to change their dependency. As amended, the rejections are traversed and arguments in support thereof are provided.

It is therefore respectfully submitted that the above amendments introduce no new matter within the meaning of 35 U.S.C. § 132.

### **Drawings**

The Examiner objected to the drawings as failing to show the first component and second component rotating (claim 1) and the directions they rotate relative to one another. Further, how the 90° phase-shifted sine and cosine signals are generated (claim 7) must be shown as requested by the Examiner.

### **Response**

In response, Applicant submits that the first component and second component are not rotating as suggested by the Examiner and therefore, the requested drawing showing directions they rotate relative to one another has not been provided. Instead Applicant submits that the motor shaft 50 is rotatable by means of a radial ball bearing 52 in the motor housing 51. The radial ball bearing 52 has bearing tolerances from which the centricity tolerances of the motor shaft 50 relative to motor housing 51 are obtained. *See* page 5, paragraph beginning on line 1.

Further, regarding the generated phase-shifted sine and cosine signals, the materialized measure in the known rotation sensor has an outer incremental track that is sensed by a circular track of optical sensor elements of the sensing device in order to generate incremental sine and cosine signals. *See* page 1, paragraph beginning on line 10. In known fashion, the incremental angle measurement signals have the shape of sine and cosine signals so that a higher angular resolution of

the incremental angle measurement is possible by interpolation of the signal voltages. *See* page 1, paragraph on line 31. Signals of the sensor elements 21 of the present invention are taken off in angle regions of the circular track offset by  $90^\circ$ , to produce incremental angle signals offset in phase relative to each other by  $90^\circ$ . By evaluation of these sine, cosine, negative sine and negative cosine signals, eccentricity errors of the materialized measure 10 or of its angular lattice structure 12 relative to sensing device 20 or to the track of its sensor elements 21 can be compensated for by calculation. *See* page 4, paragraph beginning on line 5.

Accordingly, as the claims can be interpreted in light of the specification, Applicant submits that drawing changes are not necessary. Therefore, Applicant respectfully requests that the objection to the drawings be withdrawn.

### **Specification**

The Examiner objected to the specification as failing to provide proper antecedent basis for the claimed subject matter. In particular, the specification does not seem to support the second component rotating and further fails to demonstrate how the second component rotates relative to the first component (i.e., same direction, counter clockwise, etc.).

The Examiner also made a requirement for a new title.

### **Response**

In response, as discussed above regarding the drawings, Applicant submits that the second component is not rotating as suggested by the Examiner and therefore, the support in the specification for the direction that the second component rotates relative to the first component has not been provided. Instead, the motor shaft 50 is rotatable by means of a radial ball bearing 52 in the

motor housing 51. The radial ball bearing 52 has bearing tolerances from which the centricity tolerances of the motor shaft 50 relative to motor housing 51 are obtained. *See* page 5, paragraph beginning on line 1.

Accordingly, as the specification provides proper antecedent basis for the claim language, Applicant respectfully requests that the objection to the specification be withdrawn.

Regarding the title, Applicant respectfully requests that the title be amended to:

DEVICE FOR MEASUREMENT OF ROTATIONAL ANGLE OF TWO  
COMPONENTS RELATIVE TO EACH OTHER

Accordingly, Applicant respectfully requests that the objection to the title be withdrawn.

**Rejections under 35 U.S.C. 112, 2<sup>nd</sup> paragraph**

The Examiner rejected claims 1 - 14 as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. In particular, the language in claim 1, line 2 is unclear regarding how the two components rotate relative to one another and how the angle measurement is performed. Further, in claim 1, lines 6 - 8, it is unclear as to which component the sensing device is connected. With respect to claim 6, the phrase “preferably” is indefinite. With respect to claims 10 - 13 it is unclear as to the difference between shaft (33) of claims 1 and 13 and shaft stub (33) of claims 10 - 12.

**Response**

Reconsideration and withdrawal of the rejection is respectfully requested.

The following is a quotation of the second paragraph of **35 U.S.C. 112**:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Applicant submits that all of the claims now comply with 35 U.S.C. § 112, 2<sup>nd</sup> paragraph.

In response, as discussed above regarding the drawings and the specification, Applicant submits that the two components are not rotating as suggested by the Examiner and therefore. Further, clarity for the angle measurement can be found in the specification. Again, the motor shaft 50 is rotatable by means of a radial ball bearing 52 in the motor housing 51. The radial ball bearing 52 has bearing tolerances from which the centricity tolerances of the motor shaft 50 relative to motor housing 51 are obtained. *See* page 5, paragraph beginning on line 1.

Furthermore, the sensing device is connected to rotate with the second component as recited in claim 1 by: “with a sensing device (20) that optically senses the materialized measure (10) connected to rotate in unison with the second component (51).”

Regarding claim 6 the phrase “preferably” has been deleted.

Regarding claims 10 - 13, the “shaft (33)” has been changed to --shaft stub (33)-- and “shaft (30, 33)” has been changed to --bushing and shaft stub (30, 33)--.

Accordingly, as the claims have been amended and now comply with 35 U.S.C. § 112, 2<sup>nd</sup> paragraph, Applicant respectfully requests that the rejection be withdrawn.

### **Rejections under 35 U.S.C. 102(b)**

The Examiner rejected claims 1 - 4, 10, and 11 as being anticipated by Kühne.

### **Response**

Reconsideration and withdrawal of the rejection is respectfully requested.

For a reference to anticipate an invention, all of the elements of the claimed invention must be present in the reference. The test for anticipation under section 102 is whether each and every element as set forth in the claims is found, either expressly or inherently, in a single prior art reference. *Verdegaal Bros. V. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). The elements must also be arranged as required by the claim. *In re Bond*, 15 USPQ2d 1566 (Fed. Cir. 1990).

Applicant submits that Kühne fails to disclose each and every element of independent claim 1, as amended.

In the present invention, the light source is arranged coaxially in the center of the bushing and shaft stub. *See* amended claim 1. Further, the bushing and shaft stub with the light source and the disk with the angular structure are insertable axially into the first rotating component (motor shaft), whereas the sensing device is arranged in a cap which can be fixed to the second component (motor housing). *See* Figures 4 and 6. The power is supplied to the light source by inductivity via a coil (44) fixed in the cap and a coil (34) fixed in the bushing and rotating with the bushing and light source. *See* page 5, paragraph beginning on line 25.

Kühne discloses a position encoder with closed-ring diode array. An annular photo-diode array (PDA) source 102 is arranged to be firmly connected via its contacts 104 with the bottom of the housing part 101. Between the housing half 110 and the disk 106 there is a plate 109 fixed to the housing, the plate being covered with light-emitting diodes (LEDs). *See* column 3, lines 45 - 59 and lines 60 - 66.

In amended claim 1, the light source 31 is arranged coaxially in the center of the bushing and the shaft stub. Further, according to claim 1, the sensing device (20) has a circular track of optical sensor elements (21) spaced apart at an angle and arranged coaxially to bushing and shaft stub (30, 33). The advantages of a simple construction, and easy assembling and adjustment of the device according to these features are independent of the structure of the encoder disk.

However, in Kühne there is no implicit or explicit disclosure that the PDA 102 or LEDs 109 are arranged coaxially in the center of the shaft 107. In fact, the diodes merely illuminate the annular-shaped light-sensitive layer 103 of the PDA 102.

Further, in amended claim 1, power is supplied to the light source by inductivity via a coil fixed in the cap and a coil fixed in the bushing and rotating with the bushing and light source.

In contrast, there is no discussion anywhere in the reference of power supply to the light source.

Therefore, as Kühne fails to teach or suggest each and every element of independent claim 1, namely, a coaxially arranged light source and inductive coils, Applicant submits that the reference fails to anticipate the claim, as amended, which now includes the features of claims 2, 10, and 11.

Moreover, as claims 3 and 4, depend from claim 1, Applicant submits that they are allowable for at least similar reasons.

Accordingly, Applicant respectfully requests that the rejection of claims 1 - 4, 10, and 11 under 35 U.S.C. § 102(b) be withdrawn.

### **Rejections under 35 U.S.C. 103(a)**

The Examiner rejected claims 5 and 6 as being unpatentable over Kühne in view of Wlodarczyk et al., claims 7 and 8 were rejected as being unpatentable over Kühne in view of Weibel IV et al.; claim 9 is rejected as being unpatentable over Kühne in view of Siraky; and claim 12 is rejected as being unpatentable over Kühne.

### **Response**

Reconsideration and withdrawal of the rejection is respectfully requested.

To establish a *prima facie* case of obviousness, the Examiner must establish: (1) that some suggestion or motivation to modify the references exists; (2) a reasonable expectation of success; and (3) that the prior art references teach or suggest all the claim limitations. Amgen, Inc. v. Chugai Pharm. Co., 18 USPQ2d 1016, 1023 (Fed. Cir. 1991); In re Fine, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988); In re Wilson, 165 USPQ 494, 496 (C.C.P.A. 1970).

Applicant submits that the combination of references fails to teach or suggest all of the claim limitations.

The Examiner cited Wlodarczyk et al., Weibel IV et al., and Siraky in an attempt to cure the deficiencies of Kühne regarding the dependent claims.

Wlodarczyk et al. teaches an optical shaft position and speed sensor. An optical sensing head 14 comprises a pair of optical fibers 16 and 18 coupled to an LED light source 20. *See* column 2, lines 29 -50.

Weibel IV et al. teaches a calibrated encoder multiplier. There is no discussion anywhere in the reference of a light source or inductive coils.



Siraky teaches a system for measuring the angle of rotation. Disk 5 carries tracks 2, 3, 4 which are optically scannable by optoelectronic transducers 12, 13, and 14. *See* column 3, lines 11 - 21.

However, similar to Kühne, there is no suggestion anywhere in the secondary references of a coaxially arranged light source and inductive coils.

Therefore, Wlodarczyk et al., Weibel IV et al., and Siraky fail to cure the deficiencies of Kühne. Applicant also submits that claims 5 - 9, and 12 are allowable at least for the reason that they depend from claim 1.

Accordingly, reconsideration and withdrawal of the rejections under 35 U.S.C. § 103(a) is respectfully requested.

#### **Allowable Subject Matter**

The Examiner has indicated that claims 13 and 14 contain allowable subject matter.

#### **Response**

Applicant wishes to thank the Examiner and requests that this application be passed to issue as claims 13 and 14 depend from amended claim 1, which is believed to be allowable.

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Reply to Office Action dated September 9, 2005  
Art Unit 2878  
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### CONCLUSION

In light of the foregoing, Applicant submits that the application is in condition for allowance.

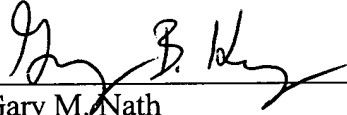
If the Examiner believes the application is not in condition for allowance, Applicant respectfully requests that the Examiner contact the undersigned attorney if it is believed that such contact will expedite the prosecution of the application.

Respectfully submitted,

**NATH & ASSOCIATES PLLC**

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